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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/699,399 | 10/30/2003 | Supratik Guha | YOR920030425US1 | 3291 |

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| EXAMINER |
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JAGAN, MIRELLYS

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| ART UNIT | PAPER NUMBER |
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2859

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|------------------------------------|---|
| Office Action Summary | Application No. 10/699,399 | Applicant(s) GUHA ET AL. | |
| | Examiner Mirellys Jagan | Art Unit 2859 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 11, 12 and 23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 13-22 and 24-28 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/30/03</u> . | 6) <input type="checkbox"/> Other: ____. |

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DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

Species 1, as shown in figure 8.

Species 2, using a detector that detects reflected photons.

Species 3, using a detector that detects luminescence.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 1-9, 13-21, and 24-28 are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to

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be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. During a telephone conversation with Mr. Jon Gibbons on September 17, 2004 a provisional election was made without traverse to prosecute the invention of Species 1, claims 1-10, 13-22, 24-28. Affirmation of this election must be made by applicant in replying to this Office action. Claims 11, 12, and 23 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Objections

4. Claims 1-10 and 26-28 are objected to because of the following informalities:

In claim 1, line 5 states that the photon detector detects photons, but it is not clear from what element the photons are being emitted from.

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Claim 26 is objected to because the preamble claims a system for measuring thermal distributions, but the body of the claim fails to provide an element for measuring the thermal distribution, e.g., a photon detector.

Claims 2-10, 27, and 28 are objected to for being dependent on an objected base claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 13-22 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01.

In claim 13, the omitted steps are the steps for measuring thermal distributions. As currently written, claim 13 claims a method for detecting photons, and not a method for measuring thermal distributions as stated in the preamble.

Claims 14-22 are rejected for being dependent on rejected base claim 13.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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8. Claims 1, 4, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S.

Patent 6,251,706 to Paniccia.

Pannicia discloses a prior art system comprising:

a duct (130) adapted to be coupled with an electronic device (102);

a coolant comprising cold gas (air 140) flowing through the duct so as to cool the device;

and

a photon detector located adjacent to the duct and the device for detecting photons;

wherein the photon detector is used to obtain thermal information from the device during operation of the device under conditions for which the device is designed (see prior art figure 4A; column 1, line 66-column 2, line 9; column 2, lines 22-35 and 43-56; and column 3, lines 4-19).

9. Claims 24-28 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,844,208 to Tustaniwskyj et al [hereinafter Tustaniwskyj].

Tustaniwskyj discloses a system comprising:

an electronic device;

a duct (14'') adapted to be coupled with the electronic device; and

a coolant (14b) flowing through the duct so as to cool the electronic device;

wherein the duct and coolant are at least partially transparent to photons with wavelengths between about 0.1-20 microns (are transparent to IR radiation) to allow a thermal measurement of the device from an exterior of the duct, and the duct comprises silicon (see figures 1 and 20; column 13, line 66-column 14, line 19; and column 15, lines 1-3).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pannicia.

Pannicia discloses a prior art system having all of the limitations of claims 3 and 10, as stated above in paragraph 5, except for the photon detector being an IR camera, and a processor coupled to the detector for generating a thermal distribution of the device based on information from the camera.

However, Pannicia discloses that a useful photon detector for thermally testing an electronic device is an IR camera (750), which is useful for providing information to obtain a thermal distribution (thermal map) of the surface of a device to thermally test the device (see figure 7D; and column 7, lines 17-37).

Referring to claims 3 and 10, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the prior art system disclosed by Pannicia by using an IR camera as the photon detector, as taught by Pannicia, in order to obtain a thermal distribution of the surface of the device when thermally testing the device. Furthermore, the system of the prior art and Pannicia disclosed above must naturally use a processor to convert the IR radiation detected by the IR camera into the thermal data used to create the thermal distribution.

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12. Claims 13, 15, 16, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pannicia.

Pannicia discloses a prior art method of thermally testing an electronic device (102) during operation, the method comprising:

detecting photons from an electronic device by using a photon detector during operation of the device, the detector located adjacent to a duct (130) that is adjacent to the device, wherein a coolant comprising cold gas (air 140) flows through the duct as to cool the device; and

generating thermal information of the device based on information from the detector;

wherein the photon detector is used to obtain thermal information from the device during operation of the device under conditions for which the device is designed (see prior art figure 4A; column 1, line 66-column 2, line 9; column 2, lines 22-35 and 43-56; and column 3, lines 4-19).

Pannicia does not disclose the prior art method using an IR camera as the photon detector for generating a thermal distribution of the device based on information from the IR camera.

However, Pannicia discloses that a useful photon detector for thermally testing an electronic device is an IR camera (750), which is useful for providing information to obtain a thermal distribution (thermal map) of the surface of a device to thermally test the device (see figure 7D; and column 7, lines 17-37).

Referring to claim 1, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the prior art method disclosed by Pannicia by using

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an IR detector as the photon detector, as taught by Pannicia, in order to obtain a thermal distribution of the surface of the device when thermally testing the device.

13. Claims 1-3, 7-10, 13-15, and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Panicia in view of Tustaniwskyj.

Panicia discloses a system for measuring a thermal distribution of an electrical device during operation, the system comprising:

a passive heat sink having a IR-transparent window (520) made of sapphire or silicon, wherein the window of the heat sink is directly coupled to the device (502), i.e., the device forms a side of the heat sink, to allow the heat generated by the device to dissipate in order cool the device; and

a photon detector comprising an IR camera (760) located adjacent the heat sink and the device to detect photons for use in generating a thermal distribution (thermal map) of the device based on information received from the IR camera, the camera capturing thermal information from the device during operation of the device under conditions for which the device is designed (see figure 7D; and column 7, lines 17-37).

Panicia does not disclose the heat sink being an active heat sink comprising a duct having a coolant flowing through the duct to cool the device; the duct and the coolant being at least partially transparent to photons with wavelengths between about 0.1-20 microns; and the duct comprising one of silicon, quartz, sapphire, glass, and diamond.

Tustaniwskyj discloses a heat sink (14'') for an electronic device (11) for removing heat generated by the device. The heat sink is an active heat sink that comprises a duct defining a

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chamber therein having a first transparent window (14f'') and a second transparent window (14e''), and an inlet and an outlet port for directing a heat-transferring liquid coolant (14b) into and out of the duct, wherein the heat sink is directly coupled to the device, i.e., the device forms a side of the heat sink. The liquid and first and second windows are transparent to IR radiation, i.e., have a wavelength between about 0.1-20 microns, wherein the windows are made of silicon. The second window of the heat sink is placed in direct thermal contact with the electronic device to remove the heat generated by the device (see figures 1, 20, and 21; column 13, line 66-column 14, line 19; and column 15, lines 1-3). The fluid of the active heat sink absorbs the heat generated by the device and removes the heat from the device, thereby quickly cooling the device.

Referring to claims 1 and 13, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Paniccia by replacing the passive heat sink with an active heat sink, as taught by Tustaniwskyj, in order to remove more heat from the device with the coolant and provide faster cooling of the device.

Furthermore, referring to claims 13-15 and 20-22, in using the system disclosed by Paniccia and Tustaniwskyj above to measure a thermal distribution of the device, the method steps of claims 13-15 and 19-22 will be naturally followed.

14. Claims 4, 6, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paniccia and Tustaniwskyj, as applied to claims 1-3, 7-10, 13-15, and 19-22 above, and further in view of U.S. Patent Application Publication 2004/000157 to Imada et al [hereinafter Imada].

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Paniccia and Tustaniwskyj disclose a system and method having all of the limitations of claims 4, 6, 16, and 18, as stated above in paragraph 9, but are silent as to the type of liquid coolant used, and therefore do not explicitly disclose the coolant being water or one of perfluorooctane, perfluorohexane, octane, hexane, and carbon tetrachloride.

Imada discloses that either of water, octane, hexane, or carbon tetrachloride is useful as liquid coolants in a cooling heat sink for electronic devices (see paragraph 67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system and method disclosed by Paniccia and Tustaniwskyj by using water, octane, hexane, or carbon tetrachloride as the liquid coolant, since Imada teaches that water, octane, hexane, or carbon tetrachloride are all useful liquid coolants for use in a heat sink.

15. Claims 5 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paniccia and Tustaniwskyj, as applied to claims 1-3, 7-10, 13-15, and 19-22 above, and further in view of U.S. Patent 5,411,077 to Tousignant.

Paniccia and Tustaniwskyj disclose a system and method having all of the limitations of claims 5 and 17, as stated above in paragraph 9, but are silent as to the type of liquid coolant used, and therefore do not explicitly disclose the coolant being one of alkanes and perfluoroalkanes.

Tousignant discloses that alkanes are useful as liquid coolants in a cooling heat transfer device for electronic devices (see column 9, lines 27-47).

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system and method disclosed by Paniccia and Tustaniwskyj by using alkanes as the liquid coolant, since Tousignant teaches that alkanes are useful liquid coolants for use in heat exchange for electronic devices.

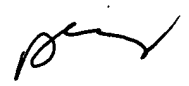
Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 571-272-2247. The examiner can normally be reached on Monday-Friday from 11AM to 4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJ
November 12, 2004


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